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AUTHOR Lidz, Carol S.; And Others
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ABSTRACT

The relationship between scores on the cognitive domain of the Battelle Developmental Inventory (BDI) and scores on the Stanford-Binet Intelligence Test (SBIT), Fourth Edition, was studied for 32 urban, low socioeconomic status (SES), African American children (22 males and 10 females) aged 3 to 5 years. The BDI is a developmental inventory designed for individual administration to children between the ages of birth through 8 years. It covers five domains (personal-social, adaptive, motor, communication, and cognitive). Results document a moderate relationship between the two tests, with a highly significant difference between the means. SBIT scores are consistently higher than BDI scores. More than half of the subjects obtained the lowest developmental quotient on the BDI, with SBIT scores for the same subjects ranging into the high 80's. It is concluded that the BDI is a poor choice for eligibility and classification decisions for this population. One table summarizes ranges, means, and standard deviations. (Author/SLD)

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Concurrent Validity of the Cognitive Domain of the Battelle Developmental Inventory in relation to the Stanford-Binet Intelligence Test, Fourth Edition for Urban African-American Low SES Preschool Children

Carol S. Lidz
United Cerebral Palsy Association
102 E. Mermaid Lane
Philadelphia, PA 19118
(215) 242-4200 ext. 299

Inge Webster
United Cerebral Palsy Association
102 E. Mermaid Lane
Philadelphia, PA 19118

Linda Townes-Rosenwein
KenCrest Services
3132 Midvale Avenue
Philadelphia, PA 19129

running head: BDI/Binet

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ABSTRACT

This study reports the relationship between the scores of 32 urban, low SES African-American children between the ages of three through five years on the cognitive domain of the Battelle Developmental Inventory in relation to the criterion of the Stanford-Binet Intelligence Test, Fourth Edition.

The results document a moderate relationship between the two tests, with a highly significant difference between the means. Binet scores are consistently higher. More than half of the subjects obtained the lowest DQ on the Battelle, with Binet SASs for the same subjects ranging into the high 80's. The Battelle was concluded to be a poor choice for eligibility and classification decisions for this population.

Concurrent Validity of the Battelle Developmental Inventory for Urban Low SES African-American Preschool Children in Relation to the Stanford-Binet Intelligence Test, Fourth Edition

Introduction

The Battelle Developmental Inventory (BDI; Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984) is among the most recent additions to the diagnostic assessment repertory for young children. Information is becoming increasingly available investigating the validity and reliability of the BDI, but much more needs to be learned about its usefulness for both programming and identification of risk status in children.

This study investigates the concurrent validity of the cognitive domain of the BDI in relation to the Stanford-Binet Intelligence Test, Fourth Edition (Thorndike, Hagen, & Sattler, 1986). The Binet was selected as a criterion measure, since it is one of the

major procedures available for assessment of cognitive functioning of young children.

The BDI has been praised for its high reliability coefficients, inclusion of a screening test, flexibility of administration (Telzrow, 1985), and usefulness for program planning at the younger, preschool ages (Telzrow, 1985; Molitor & Kramer, 1987; McLinden, 1989).

Conversely, the BDI has been negatively criticized for its limited floor (McLinden, 1989;Telzrow, 1985), extensive administration time, low relationship with cognitive measures (along with considerable overlap with the Vineland Social Maturity Scale and Developmental Activities Screening Inventory), poor score discriminability, especially above age 5, greater success as a norm- rather than criterion-referenced procedure (Molitar & Kramer, 1987), gaps in content coverage, and weak support for concurrent validity (McLinden, 1989). Both McLinden (1989) and Boyd (1989) highlight the potential insensitivity attributable to wide age spans of the BDI scores.

Existing evidence regarding concurrent validity is available from studies such as McLean, McCormick, Bruder, and Burdg (1987) who administered the

Battelle to 40 handicapped children between the ages of birth to 30 months. The criterion measures were the Bayley Scales of Infant Development-Mental and Motor Scales, and the Vineland Adaptive Behavior Scales: Survey Form Edition. Correlations with the Bayley were all significant beyond .01 and ranged from .750 to .923, with the highest correlation between the BDI Cognitive Domain and Bayley Mental Development Index. Correlations with the Vineland were also all significant beyond .01 and ranged from .728 to .951, with the motor scales showing the highest relationship; the Cognitive Domain correlated .836 with both social and motor scales. Significant differences were found between the means of the Vineland and the BDI Composite scores, but not between the Bayley Mental Development Index and the BDI composites. Scores on the Vineland were generally higher than the Bayley or the BDI.

Boyd, Welge, Sexton, & Miller (1989) also reported results of a concurrent validity study correlating the BDI with Bayley Scale scores of 30 disabled infants between the ages of birth through 36 months. Higher correlations were found for age equivalents than for DQs, which was thought to be

related to the differing floors of the two measures. Correlations for age equivalents with the BDI were uniformly above .8 for the Bayley Mental Development Index, and ranged between .67 and .95 for the Bayley Psychomotor Development Index. Correlations between DQs ranged from .41 to .63 for the Bayley MDI and between .27 and .47 for the Bayley PDI. The highest correlation between BDI and Bayley MDI was with BDI Cognitive Domain, and the lowest, with Motor Domain. For the Bayley PDI, the highest DQ correlation was with the BDI Motor domain, and the lowest with BDI Communication domain. All the relationships were statistically significant, most beyond .000. The BDI tended to yield lower total age equivalents than the Bayley, found to be significantly different, although the scores on the Cognitive Domain were not significantly different.

Investigating the concurrent validity of the BDI with 20 white, middle class speech and language disordered children between the ages of 35 to 60 months, Mott (1987) reported highly significant (<.001) correlations between the BDI Communication DQ and the Preschool Language Scale-Revised, as well as between the Expressive Communication and

Cognitive DQs of the BDI. This author also found significant relationships between the BDI Expressive Communication DQ and the Peabody Picture Vocabulary Test-Revised and between the total Composite DQ and the PPVT-R. BDI Composite DQ was correlated at <.01 with the Preschool Language Scale-Revised.

To summarize, concurrent validity studies of the Battelle have focused on infants, and have compared the Battelle primarily with the Bayley. The study including older preschool children focused on the communication domain. This study provides concurrent validity data regarding the cognitive domain of the BDI for older preschool children who have been referred by their teachers with concerns about their learning or adjustment in their preschool program. Therefore, accurate diagnosis and determination of risk is particularly important for this population.

Method

Subjects

Thirty-two children between the ages of 38 to 62 months (mean 50.9 months; s.d. 6.6) were involved in this study. There were 22 boys and 10 girls. All subjects were enrolled in an urban preschool program with eligibility established by poverty status, and all were of African-American ethnic backgrounds. All subjects were referred for psychological assessment related to mild to moderate learning and/or behavioral concerns, but all were maintained in a mainstream program. The examiners were certified school psychologists. Subjects were included in this study based on teacher referral and examiner ability to complete the procedures; therefore, subject selection is a limitation of this study.

Procedure

The cognitive domain of the BDI and the all the preschool subtests of the Stanford-Binet, Fourth Edition (SB,IV) were administered in alternating order to the subjects. The Cognitive Domain of the BDI was the only section of this test that was administered. These measures were part of larger batteries selected to relate to specific referral issues. The two measures of this study were administered within two to three weeks of each other according to standardized directions. The scores of the Binet were converted to estimated SAS according to the Binet manual because of the differences in the standard deviations of the two measures.

Measures

Battelle Developmental Inventory (BDI):

The BDI was first released in 1984, and again, with recalibrated norms, in 1988. It is a developmental inventory designed for individual administration to children between the ages of birth

through 8 years. The battery covers five domains: personal-social, adaptive, motor, communication, and cognitive. The norms were recalibrated in 1987 "in order to resolve some inconsistencies in the norm tables" (1988, P.12).

The mean DQ for the BDI is 100, and the standard deviation, 15. Norms for the BDI were collected between 1982 and 1983 on a sample of 800 children. The sample appears representative of the U.S. census in terms of geographic location, age, race, and sex. Test-retest reliability is quite high, with coefficients mostly in the .90's. Factor analytic results support the placement of most items within their domains. Relevant to the current research, the BDI manual reports data regarding criterion-related validity. Concurrent validity comparisons are reported between the BDI and: The Vineland Social Maturity Scale, Developmental Activities Screening Inventory, Stanford-Binet Intelligence Scale (1960 version), Wechsler Intelligence Scale for Children-Revised, and the Peabody Picture Vocabulary Test (1981 version). Correlations of the cognitive domain with the Stanford-Binet and WISC-R are as follows: .50 (Binet), .43 (WISC-R, Verbal IQ), .02 (WISC-R Performance IQ),

and .44 (WISC-R, Full Scale IQ). The strongest correlation with the Binet and WISC-R Verbal IQ is the BDI fine motor domain (i.e., not cognitive), and the strongest correlations with the WISC-R Full Scale IQ are BDI fine motor, total motor, and expressive language subdomains.

The Stanford-Binet Intelligence Scale: Fourth Edition is a frequently used, well-inknown, individually administered procedure for estimating cognitive functioning in young and school-age children.

The mean DQ of the S-B,IV is 100, with a standard deviation of 16. The standard deviation thus differs from the BDI's of 15. However, the Technical Manual of the S-B,IV (P.131) offers a comparision of scale values between measures with standard deviations of 16 versus 15.

Results

Table 1 shows the ranges, means, and standard deviations of the BDI and Binet test scores of the subjects.

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Table 1 shows that the average BDI scores were in the "slow learner" range, while the average Binet scores were low normal. The range of the BDI is also more restricted, with 65 representing the lowest possible score on this measure (obtained by 21 of the subjects).

Concurrent validity of the BDI cognitive domain was estimated by correlating BDI recalibrated DQs with Stanford-Binet estimated SASs , and by calculating t-tests between the means of these two measures. The Binet scores were converted to estimated SAS because of the differences in standard deviations between the measures (BDI = 15; Binet = 16). Pearson product moment correlation yields a coefficient of .62, and paired samples t-test results in

a t of 9.6 (mean difference 13; s.d. 7.68; probability .000).

These results document a moderately high correlation between the BDI cognitive domain and the Binet-IV full scale DQ, but a highly significant difference between the means of these measures, with wider range and higher scores on the Binet. All but two of the Binet scores were higher.

Discussion

This study offers evidence of a moderate positive relationship between the BDI cognitive domain and the SB-IV, supporting, to a modest degree, the concurrent validity of the BDI cognitive domain. While these correlations are even stronger than those reported in the BDI manual, there are several restrictions to interpreting this result as supportive of the BDI cognitive domain's concurrent validity. First of all, the size of the relationship is very likely to be inflated by the BDI's restricted floor. It is not possible to achieve a DQ on the BDI below 65, and over half of the subjects obtained this lowest score. The large proportion of children obtaining the lowest possible

score on the BDI is similar to the findings of Bailey et al. (1987), who found that 75% of their Ss scored at this level.

Secondly, the BDI in virtually all but two cases underestimated SB-IV scores, with a mean difference as high as 13 points. Children obtaining DQs on the BDI of 65 obtained SB-IV DQs as high as 89. While this may imply that "higher is better", a test that yields such consistently low scores and such limited range presents serious problems for interpretation and inference regarding risk status. Ultimately, predictive validity results would document the accuracy of this procedure in detecting risk. These findings are consistent with previous studies documenting consistently lower BDI scores, when compared with the Bayley (e.g., Boyd, Welge, Sexton, & Miller, 1989; McLean, McCormick, Bruder, & Burdg, 1987).

While providing some support for the concurrent validity of the BDI cognitive domain, the results of this study also suggest that the BDI may not be the instrument of choice for low functioning, mildly handicaped preschool children, particularly if classification and placement are issues for the assessment. Administration of the BDI may result in

overclassification of retarded children. It would therefore be advisable to administer another cognitive measure for children obtaining DQs in the "retarded" range on the BDI, reserving the BDI information for curriculum-referenced purposes, or to select an alternative procedure in the first place. Studies of predictive validity would be necessary before concluding that the finding of consistently low scores are inaccurate; however, the fact that so many children obtain the same low score suggests a lack of discriminability and reduces the meaningfulness of the scores.

This study is limited by the small sample size and uncontrolled sample selection, and any interpretations would of course apply to a similar population.

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Table 1

Battelle and Binet Ranges, Means, and Standard Deviations

	Range	Mean	S.D.
Battelle	**65-99**	**69.7**	**7.96**
Binet	**54-105**	**82.7**	**9.37**